

**IN THE UNITED STATES DISTRICT COURT  
FOR THE EASTERN DISTRICT OF TEXAS  
MARSHALL DIVISION**

**INFERNAL TECHNOLOGY, LLC, and  
TERMINAL REALITY, INC.,**

*Plaintiffs,*

**v.**

**MICROSOFT CORP.,**

*Defendant.*

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**Civil Action No. \_\_\_\_\_**

**Jury Trial Demanded**

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**PLAINTIFFS' COMPLAINT FOR PATENT INFRINGEMENT**

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Plaintiff Infernal Technology, LLC and Terminal Reality, Inc. file this Complaint against Microsoft Corporation and allege as follows.

**PARTIES**

1. Plaintiff Infernal Technology, LLC (“Infernal Technology”) is a Texas Limited Liability Company located at 18484 Preston Road, Suite 102-189, Dallas, Texas 75252.

2. Plaintiff Terminal Reality, Inc. (“Terminal Reality”) is a Texas Corporation with its address at P.O. Box 271721, Flower Mound, Texas, 75027-1721. Terminal Reality, a video game development and production company, was formed in 1994 in Lewisville, Texas. Terminal Reality developed a number of video games, such as *Nocturne*, *Bloodrayne*, *Ghostbusters: The Video Game*, *Kinect Star Wars*, *The Walking Dead: Survival Instinct*, and many others. Terminal Reality also developed a video game graphics engine, called the “Infernal Engine,” used in many of Terminal Reality’s games. In addition to using the “Infernal Engine” in its own games, Terminal Reality successfully licensed the “Infernal Engine” to other

video game developers for use in their video games. On June 3, 2014, Terminal Reality granted Infernal Technology an exclusive license to a number of patents, including the Asserted Patents as defined below, and the exclusive right to enforce same. Infernal Technology and Terminal Reality are collectively referred to herein as “Plaintiffs.”

3. Defendant Microsoft Corporation (“Microsoft” or “Defendant”) is a corporation organized and existing under the laws of the State of Washington, with its principal place of business located at One Microsoft Way, Redmond, Washington, 98052. Microsoft may be served with process through its registered agent Corporation Service Company d/b/a CSC, 211 E. 7th Street, Suite 620, Austin, Texas 78701.

#### **JURISDICTION AND VENUE**

4. This is an action for patent infringement arising under the patent laws of the United States of America, Title 35, United States Code. This Court has original jurisdiction over the subject matter of this action pursuant to 28 U.S.C. §§ 1331 and 1338(a).

5. Microsoft is engaged in the business of developing, testing, publishing, distributing, and selling video games. Many of these video games employ game engines which infringe one or more claims of the patents asserted in this complaint (“Accused Game Engines”). These Accused Game Engines include the Unreal Engine 4, CryEngine 3, CryEngine 4, Alan Wake Engine, Renderware Engine, Forge Engine, Forzatech Engine, Northlight Engine, Unity Engine, Foundation Engine, Halo 4 Engine, Halo 5: Guardians Engine, and Halo: Reach Engine. The Accused Game Engines are game engines that are capable of performing deferred rendering, deferred shading, deferred lighting, physically based shading, and/or physically based rendering used in video games developed, published, distributed, and/or sold by Microsoft. The video games developed, published, distributed, and/or sold by Defendant that use the Accused Game

Engines include, but are not limited to, Alan Wake, Crackdown, Crackdown 2, Crackdown 3, Dead Rising 3, Fable Legends, Forza Motorsport 6, Forza Motorsport 7, Gears of War 4, Halo 4, Halo 5: Guardians, Halo: Reach, Kalimba, Ori and the Blind Forest, PlayerUnknown's Battlegrounds, Quantum Break, ReCore, Rise of the Tomb Raider, Ryse: Son of Rome, Sea of Thieves, State of Decay, and Super Lucky's Tale. Alan Wake and all other games developed, published, distributed, and/or sold by Microsoft that use the Accused Game Engines and referred to herein as the "Accused Games." Microsoft has developed, published, distributed, used, offered for sale and sold the Accused Games in the United States, including within this District.

6. Microsoft is also engaged in the business of manufacturing and selling gaming and entertainment consoles which are designed, among other things, to play video games, including the Accused Games. Among the gaming and entertainment consoles manufactured and sold by Microsoft are the Xbox 360 console and the Xbox One console. Microsoft has manufactured and sold at least three variants of the Xbox 360 console: The "original Xbox 360," the "Xbox 360 S," and the "Xbox 360 E." Microsoft has manufactured and sold at least four variants of the Xbox One console: the "Xbox One," the "Xbox One Elite," the "Xbox One S," and the "Xbox One X." These variants of the Xbox 360 and Xbox One consoles are collectively referred to herein as the "Accused Xbox Consoles." Microsoft has sold the Accused Xbox Consoles in the United States, including within this District.

7. Microsoft is also engaged in the business of manufacturing and selling laptop computing and gaming devices which are designed, among other things, to play video games, including the Accused Games. One such line of laptop computing and gaming devices manufactured and sold by Microsoft is called the Surface personal computer. Microsoft has manufactured and sold at least six variants of the Surface personal computer using the Windows

10 Pro operating system specifically designed to play video games, including the Accused Games: Surface Pro 3 (with Windows 10 Pro operating system), Surface Pro 4, Surface Pro (2017), Surface Book, Surface Book 2, and Surface Studio. These variants are collectively referred to herein as the “Accused Surface Computing and Gaming Devices.” Microsoft has sold the Accused Surface Computing and Gaming Devices in the United States, including within this District.

8. The Accused Game Engines, Accused Games, Accused Xbox Consoles and Accused Surface Computing and Gaming Devices are collectively referred to herein as the “Accused Instrumentalities.”

9. Microsoft is subject to this Court’s specific personal jurisdiction because it (a) is a resident of the State of Texas; and (b) has designated an agent for service of process in the State of Texas; and (c) has committed acts of infringement in the State of Texas as alleged herein. Therefore, this Court has personal jurisdiction over the Defendant under the Texas long-arm statute, TEX. CIV. PRAC. & REM. CODE §17.042.

10. Venue is proper in this district under 28 U.S.C. §§ 1400(b). Microsoft has committed acts of infringement in this District by selling, offering to sell and using the Accused Instrumentalities in this District, and has a regular and established place of business in this district located at 2601 Preston Rd #1176, Frisco, TX 75034.

### **THE PATENTS-IN-SUIT**

11. On March 26, 2002 the United States Patent and Trademark Office issued United States Patent No. 6,362,822 (the “’822 Patent”) entitled “Lighting and Shadowing Methods and Arrangements for use in Computer Graphic Simulations,” a true copy of which is attached as Exhibit 1.

12. On June 13, 2006, the United States Patent and Trademark Office issued United States Patent No. 7,061,488 (the “’488 Patent”) entitled “Lighting and Shadowing Methods and Arrangements for use in Computer Graphic Simulations,” a true copy of which is attached as Exhibit 2. The ’488 Patent is a continuation-in-part of the ’822 Patent. The ’822 and ’488 Patents are collectively referred to as the “Asserted Patents.”

13. Infernal Technology is the exclusive licensee of the ’822 and ’488 Patents and has the exclusive right to sue for and recover all past, present and future damages for infringement of the Asserted Patents.

**MICROSOFT’S DEALINGS WITH TERMINAL REALITY  
AND KNOWLEDGE OF THE PATENTS-IN-SUIT**

14. Beginning in 1995, Microsoft entered into agreements with Terminal Reality to develop video games for Microsoft for operation on the Microsoft Windows operating system. These video games included video games called “Cyberfighter,” “Monster Truck Madness,” and “Fury.”

15. Thereafter, Terminal Reality continued to develop video games as a third-party developer for use on Microsoft’s Xbox and Xbox 360 gaming and entertainment consoles.

16. In June of 2005, Microsoft applied for a patent addressing the use of pre-computed shadow fields in lighting and shading techniques used in video games. The patent application number is 11/147,921 (the “Microsoft Patent Application”).

17. Shortly thereafter, the examiner at the United States Patent and Trademark Office (the “USPTO”) assigned to the Microsoft Patent Application cited the ’488 Patent as relevant prior art. The ’488 Patent expressly refers to the ’822 Patent, which is the parent of the ’488 Patent.

18. On January 5, 2007, the examiner rejected all of the pending claims of the Microsoft Patent Application based upon the disclosure in the '488 Patent.

19. Between 2007 and 2009, Microsoft made amendments to the pending claims of the Microsoft Patent Application and submitted remarks in order to distinguish the invention claimed in the Microsoft Patent Application from the '488 Patent. The examiner continued to reject some or all of the pending claims of the Microsoft Patent Application based upon the disclosure in the '488 Patent.

20. In January 2009, Microsoft made amendments to the pending claims still subject to rejection by the examiner and argued these amendments overcame the rejections based upon the '488 Patent.

21. On March 9, 2009, the USPTO issued a notice of allowance relating to the pending claims of the Microsoft Patent Application. On May 26, 2009, the USPTO issued United States Patent No. 7,538,766 based upon the Microsoft Patent Application.

22. In 2009, Microsoft entered into an agreement with Terminal Reality providing for Terminal Reality to develop a video game for Microsoft based upon the Star Wars movie theme.

23. During the Star Wars video game project, Microsoft requested Terminal Reality to provide Microsoft personnel with access to the source code for the Infernal Game Engine developed by Terminal Reality and incorporating the inventions claimed in the Asserted Patents. Terminal Reality granted Microsoft access to the source code for the Infernal Game Engine on a confidential basis.

#### **THE ESTABLISHED VALIDITY OF THE PATENTS-IN-SUIT**

24. On April 21, 2016, Electronic Arts Inc. ("EA") petitioned the U.S. Patent Trial and Appeal Board ("PTAB") for *inter partes* review of the '822 and '488 Patents (IPR2016-

00928, IPR2016-00929, IPR2016-00930Z). In the IPR petitions, EA relied upon the following prior art references: (1) Segal, *et al.*, “Fast Shadows and Lighting Effects Using Texture Mapping,” *Computer Graphics Proceedings*, Volume 26, Number 2, July, 1992 (“Segal”); and (2) McReynolds, “Programming with OpenGL: Advanced Rendering,” SIGGRAPH ’96 Course, August, 1996 (“McReynolds”). With respect to the ’822 Patent, EA asserted that Claims 1-10 and 39-48 were unpatentable under 35 U.S.C. § 103 in view of Segal, and that Claims 1-20 and 39-48 were unpatentable under 35 U.S.C. § 103 as obvious over the combination of Segal and McReynolds. With respect to the ’488 Patent, EA argued that Claims 1-10, and 27-62 were unpatentable under Section 103 in view of Segal and that Claims 1-20 and 27-36 were unpatentable under Section 103 in view of Segal in combination with McReynolds.

25. On October 25, 2016, the PTAB instituted IPR proceedings as to all challenged claims of the ’822 and ’488 Patents. In addition to the Segal and McReynolds references asserted by EA in its petitions, the PTAB instituted IPR based on an additional prior art reference: James D. Foley, *et al.*, *COMPUTER GRAPHICS, PRINCIPLES AND PRACTICE*, 2<sup>d</sup> ed. (1997) (“Foley”). Oral argument was heard by the PTAB on July 18, 2017. On October 19, 2017, and on October 23, 2017, the PTAB issued its Final Written Decisions in the IPR proceedings rejecting all of EA’s challenges to the patentability of all claims of the ’822 and ’488 Patents in view of Segal, alone or in combination with McReynolds and/or Foley. Shortly thereafter, EA settled Plaintiffs’ patent infringement claims and entered into a formal settlement agreement with Plaintiffs.

**CLAIM 1 -- INFRINGEMENT OF U.S. PATENT NO. 6,362,822**

26. Plaintiffs incorporate paragraphs 1 through 25 as though fully set forth herein.

27. Upon information and belief, Microsoft has been and is now directly infringing one or more of the method claims of the '822 Patent in the United States, by using those methods through, among things, testing, displaying and demonstrating the Accused Games and Accused Game Engines in violation of 35 U.S.C. § 271(a). The Accused Games and Accused Game Engines perform the lighting and shadowing methods described and claimed in one or more of the method claims of the '822 Patent.

28. For example, but not as a limitation, Microsoft's direct infringement of Claim 1 of the '822 Patent with respect to Accused Games using the CryENGINE, Alan Wake Engine, Unity Engine, and Unreal Engine is shown in the claim charts of Exhibits 3, 5, 7, and 9.

29. As set forth in Exhibits 3, 5, 7, and 9, each of the Accused Games and Accused Game Engines performs a shadow rendering method for use in a computer system.

30. As set forth in Exhibits 3, 5, 7, and 9, each of the Accused Games and Accused Game Engines provides observer data of a simulated multi-dimensional scene.

31. As set forth in Exhibits 3, 5, 7, and 9, each of the Accused Games and Accused Game Engines provides lighting data associated with a plurality of simulated light sources arranged to illuminate the simulated multi-dimensional scene, said lighting data including light image data.

32. As set forth in Exhibits 3, 5, 7, and 9, for each of the plurality of light sources, each of the Accused Games and Accused Game Engines compares at least a portion of the observer data with at least a portion of the lighting data to determine if a modeled point within



the scene is illuminated by the light source, and stores at least a portion of the light image data associated with the modeled point and the light source in a light accumulation buffer.

33. As set forth in Exhibits 3, 5, 7, and 9, each of the Accused Games and Accused Game Engines combines at least a portion of the light accumulation buffer with the observer data.

34. As set forth in Exhibits 3, 5, 7, and 9, each of the Accused Games and Accused Game Engines displays the resulting image data to a computer screen.

35. Because all of the Accused Games and Accused Game Engines perform deferred rendering/shading/lighting, and/or physically based shading/rendering as exemplified in Exhibits 3, 5, 7, and 9, any Accused Games employing any of the Accused Game Engines infringes one or more of the method claims of the '822 Patent in a manner substantially the same as shown in the exemplary claim charts of Exhibits 3, 5, 7, and 9.

36. Microsoft, with knowledge of the '822 Patent, has been and is now indirectly infringing one or more of the method claims of the '822 Patent by inducing third-party end users of the Accused Games and third-party developers using the Accused Game Engines to develop video games which directly infringe one or more of the method claims of the '822 Patent in violation of 35 U.S.C. § 271(b) by playing the Accused Games using the Accused Game Engines.

37. Microsoft, with knowledge of the '822 Patent, has been and is now indirectly infringing one or more of the method claims of the '822 Patent by selling the Accused Xbox Consoles inducing third party end users of the Accused Xbox Consoles to directly infringe one or more of the method claims of the '822 Patent in violation of 35 U.S.C. § 271(b) by playing the Accused Games and using the Accused Game Engines on the Accused Xbox Consoles.

38. Microsoft, with knowledge of the '822 Patent, has been and is now indirectly infringing one or more of the method claims of the '822 Patent by selling the Accused Surface Computing and Gaming Devices inducing third-party end users of those devices to directly infringe one or more of the method claims of the '822 Patent in violation of 35 U.S.C. § 271(b) by playing the Accused Games thereby using the Accused Game Engines on the Accused Surface Computing and Gaming Devices.

39. Upon information and belief, Microsoft has designed the Accused Games using the Accused Game Engines, the Accused Xbox Consoles and the Accused Surface Computing and Gaming Devices for the specific purpose of enabling third-party end users of these devices to play video games using one or more of the methods claimed in one or more of the method claims of the '822 Patent, and enabling third-party video game developers to develop Accused Games using one or more of such methods.

40. Upon information and belief, Microsoft has promoted use of the Accused Games and Accused Game Engines, which perform one or more methods claimed in one or more of the method claims of the '822 Patent, by third-party end users and third-party video game developers of the Accused Games and Accused Game Engines. Microsoft has promoted such use of the Accused Games and Accused Game Engines with the knowledge that such use would result in performance of one or more methods of one or more of the method claims of the '822 Patent. Performance of the lighting and shadowing methods claimed in one or more of the method claims of the '822 Patent is an essential part of the functionality of the Accused Game Engines and Accused Games. Upon information and belief, Microsoft provides third-party end users with instructions regarding how to install and play Accused Games with the knowledge that doing so will result in performing one or more of the methods claimed in the method claims of

the '822 Patent. Upon information and belief, Microsoft has intended, and continues to intend, to induce third-party end users and video game developers to use the Accused Games or Accused Game Engines to perform one or more of the methods claimed in the method claims of the '822 Patent.

41. Upon information and belief, Microsoft has promoted use of the Accused Xbox Consoles to play Accused Games performing one or more of the methods claimed in one or more of the method claims of the '822 Patent. Microsoft has promoted such use of the Accused Xbox Consoles with the knowledge that it would result in performance of one or more of the methods of one or more of the method claims of the '822 Patent. Upon information and belief, Microsoft has intended, and continues to intend, to induce third-party end users of the Accused Xbox Consoles to use the Accused Games on those devices to perform one or more methods of claimed in the method claims of the '822 Patent.

42. Upon information and belief, Microsoft has promoted use of the Accused Surface Computing and Gaming Devices by third-party end users to play Accused Games performing one or more of the methods claimed in one or more of the method claims of the '822 Patent. Microsoft has touted that the Windows 10 Pro operating system used by the Accused Surface Computing and Gaming Devices is “the best Windows ever for gaming,” and that such devices are a “gaming powerhouse” providing an “immersive” gaming experience with “amazing built-in features like the Game Bar.” Microsoft has promoted such use of the Accused Surface Computing and Gaming Devices with the knowledge that it would result in performance of one or more of the methods of one or more of the method claims of the '822 Patent. Upon information and belief, Microsoft has intended, and continues to intend, to induce third-party end users of the Accused Surface Computing and Gaming Devices to use the Accused Games on

those devices to perform one or more methods of claimed in the method claims of the '822 Patent.

43. Upon information and belief, Microsoft has had knowledge that its conduct of designing, developing, promoting, providing and selling the Accused Instrumentalities would cause third-party end users and third-party video game developers to perform one or more methods claimed in one or more of the method claims of the '822 Patent, or has been willfully blind to the possibility that its acts would induce such direct infringement. On information and belief, Microsoft is or should be aware that the Accused Games and Accused Game Engines perform one or more of the lighting and shadowing methods of one or more of the method claims of the '822 Patent and, therefore, that third-party end users and video game developers using the Accused Instrumentalities will directly infringe the '822 Patent by using the Accused Game Engines and Accused Games.

44. Plaintiffs have been damaged by Microsoft's activities infringing the '822 Patent.

45. As alleged above, Microsoft has had actual notice of the existence of the '822 Patent since at least 2005 and has been intimately familiar with the nature and scope of the claims of the '822 Patent. Microsoft has designed the Accused Games using the Accused Game Engines for the specific purpose of performing one or more of the methods claimed in the method claims of the '822 Patent and enabling users of these Accused Game Engines and the Accused Games to perform those infringing methods. Microsoft also has promoted use of the Accused Games performing the methods of the asserted method claims of the '822 Patent by customers and end users of the Accused Games with the knowledge that such use of the Accused Games would result in performance of the methods of the asserted method claims of the '822 Patent by customers and end users of the Accused Games. Microsoft, by virtue of its prosecution

of the Microsoft Patent Application and other knowledge, has understood that there is no prior art that invalidates the asserted method claims of the '822 Patent. Microsoft's knowing infringement of one or more of the method claims of the '822 Patent has been egregious and willful. Plaintiffs, therefor are entitled to enhanced damages pursuant to 35 U.S.C. § 284.

**CLAIM 2 – INFRINGEMENT OF U.S. PATENT NO. 7,061,488**

46. Plaintiffs incorporate paragraphs 1 through 25 as though fully set forth herein.

47. Upon information and belief, Microsoft has been and is now directly infringing one or more of the method claims of the '488 Patent in the United States, by using those methods through, among things, testing, displaying and demonstrating the Accused Games and Accused Game Engines in violation of 35 U.S.C. § 271(a). The Accused Games and Accused Game Engines perform the lighting and shadowing methods described and claimed in one or more of the method claims of the '488 Patent.

48. For example, but not as a limitation, Microsoft's direct infringement of Claim 1 of the '488 Patent with respect to the Accused Games using the CryENGINE, Alan Wake Engine, Unity Engine, and Unreal Engine is shown in the claim charts of Exhibits 4, 6, 8, and 10.

49. As set forth in Exhibits 4, 6, 8, and 10, each of the Accused Instrumentalities and Accused Game Engines performs a shadow rendering method for use in a computer system.

50. As set forth in Exhibits 4, 6, 8, and 10, each of the Accused Instrumentalities and Accused Game Engines provides observer data of a simulated multi-dimensional scene.

51. As set forth in Exhibits 4, 6, 8, and 10, each of the Accused Games and Accused Game Engines provides lighting data associated with a plurality of simulated light sources arranged to illuminate the simulated multi-dimensional scene, said lighting data including light image data.

52. As set forth in Exhibits 4, 6, 8, and 10, for each of the plurality of light sources, each of the Accused Games and Accused Game Engines compares at least a portion of the observer data with at least a portion of the lighting data to determine if a modeled point within the scene is illuminated by the light source, and stores at least a portion of the light image data associated with the modeled point and the light source in a light accumulation buffer.

53. As set forth in Exhibits 4, 6, 8, and 10, each of the Accused Games and Accused Game Engines combines at least a portion of the light accumulation buffer with the observer data.

54. As set forth in Exhibits 4, 6, 8, and 10, each of the Accused Games and Accused Game Engines outputs the resulting image data.

55. Because all of the Accused Games and Accused Game Engines, upon information and belief, perform deferred rendering/shading/lighting, and/or physically based shading/rendering as exemplified in Exhibits 4, 6, 8, and 10, any Accused Games employing any of the Accused Game Engines infringes one or more of the method claims of the '488 Patent in a manner substantially the same as shown in the exemplary claim charts of Exhibits 4, 6, 8, and 10.

56. Because all of the Accused Game Engines, upon information and belief, are capable of performing deferred rendering/shading/lighting, and/or physically based shading/rendering as described above with respect to the example Accused Game Engines, each of the Accused Engines infringes in a manner similar to as shown in the exemplary claim charts of Exhibits 4, 6, 8, and 10.

57. Upon information and belief, Microsoft has been and is now directly infringing one or more claims of the '488 Patent by manufacturing and selling or offering to sell in the

United States the Accused Xbox Consoles which comprise the elements of one or more of the apparatus claims of the '488 Patent in violation of 35 U.S.C. § 271(a).

58. For example, but not as a limitation, Microsoft's direct infringement of Claim 11 of the '488 Patent with respect to the Xbox 360 Consoles is shown in the claim chart of Exhibit 11, and the Xbox One Consoles is shown in the claim chart of Exhibit 12.

59. As set forth in Exhibits 11 and 12, each of the Accused Xbox Consoles comprises an output to a display screen configured to display image data.

60. As set forth in Exhibits 11 and 12, each of the Accused Xbox Consoles further comprises a memory for storing data including observer data associated with a simulated multi-dimensional scene, and lighting data associated with a plurality of simulated light sources arranged to illuminate said scene, said lighting data including light image data, said memory further including a light accumulation buffer portion and a frame buffer portion.

61. As set forth in Exhibits 11 and 12, each of the Accused Xbox Consoles further comprises at least one processor coupled to said memory and said output and operatively configured to, for each of said plurality of light sources, compare at least a portion of said observer data with at least a portion of said lighting data to determine if a modeled point within said scene is illuminated by said light source and storing at least a portion of said light image data associated with said point and said light source in said light accumulation buffer, then combining at least a portion of said light accumulation buffer with said observer data, and storing resulting image data in said frame buffer, and outputting at least a portion of said image data in said frame buffer via said output.

62. Because all of the Accused Xbox Consoles comprise each of the elements of Claim 11 of the '488 Patent, as exemplified in Exhibits 11 and 12, Microsoft has and continues

to directly infringe at least Claim 11 of the '488 Patent by manufacturing and selling or offering to sell in the United States the Accused Xbox Consoles.

63. Upon information and belief, Microsoft has been and is now directly infringing one or more claims of the '488 Patent by manufacturing and selling or offering to sell in the United States the Accused Surface Computing and Gaming Devices which comprise the elements of one or more of the apparatus claims of the '488 Patent in violation of 35 U.S.C. § 271(a).

64. For example, but not as a limitation, Microsoft's direct infringement of Claim 11 of the '488 Patent with respect to the Accused Surface Computing and Gaming Devices is shown in the claim chart of Exhibit 13.

65. As set forth in Exhibit 13, each of the Accused Surface Computing and Gaming Devices comprises an output to a display screen configured to display image data.

66. As set forth in Exhibit 13, each of the Accused Surface Computing and Gaming Devices further comprises a memory for storing data including observer data associated with a simulated multi-dimensional scene, and lighting data associated with a plurality of simulated light sources arranged to illuminate said scene, said lighting data including light image data, said memory further including a light accumulation buffer portion and a frame buffer portion.

67. As set forth in Exhibit 13, each of the Accused Surface Computing and Gaming Devices further comprises at least one processor coupled to said memory and said output and operatively configured to, for each of said plurality of light sources, compare at least a portion of said observer data with at least a portion of said lighting data to determine if a modeled point within said scene is illuminated by said light source and storing at least a portion of said light image data associated with said point and said light source in said light accumulation buffer, then



combining at least a portion of said light accumulation buffer with said observer data, and storing resulting image data in said frame buffer, and outputting at least a portion of said image data in said frame buffer via said output.

68. Because all of the Accused Surface Computing and Gaming Devices comprise each of the elements of Claim 11 of the '488 Patent, as exemplified in Exhibits 13, Microsoft has and continues to directly infringe at least Claim 11 of the '488 Patent by manufacturing and selling or offering to sell in the United States the Accused Surface Computing and Gaming Devices.

69. Upon information and belief, Microsoft has been and is now directly infringing one or more claims of the '488 Patent by manufacturing and selling or offering to sell in the United States the Accused Surface Computing and Gaming Devices which comprise the elements of one or more of the apparatus claims of the '488 Patent in violation of 35 U.S.C. § 271(a).

70. Microsoft, with knowledge of the '488 Patent, has been and is now indirectly infringing one or more of the method claims of the '488 Patent by inducing third-party end users of the Accused Games and third-party developers using the Accused Game Engines to develop video games which directly infringe one or more of the method claims of the '488 Patent in violation of 35 U.S.C. § 271(b) by playing the Accused Games using the Accused Game Engines.

71. Microsoft, with knowledge of the '488 Patent, has been and is now indirectly infringing one or more of the method claims of the '488 Patent by selling the Accused Xbox Consoles inducing third party end users of the Accused Xbox Consoles to directly infringe one

or more of the method claims of the '822 Patent in violation of 35 U.S.C. § 271(b) by playing the Accused Games and using the Accused Game Engines on the Accused Xbox Consoles.

72. Microsoft, with knowledge of the '488 Patent, has been and is now indirectly infringing one or more of the method claims of the '488 Patent by selling the Accused Surface Computing and Gaming Devices inducing third-party end users of those devices to directly infringe one or more of the method claims of the '488 Patent in violation of 35 U.S.C. § 271(b) by playing the Accused Games thereby using the Accused Game Engines on the Accused Surface Computing and Gaming Devices.

73. Upon information and belief, Microsoft has designed the Accused Games using the Accused Game Engines, the Accused Xbox Consoles and the Accused Surface Computing and Gaming Devices for the specific purpose of enabling third-party end users of these devices to play video games using one or more of the methods claimed in one or more of the method claims of the '488 Patent, and enabling third-party video game developers to develop Accused Games using one or more of such methods.

74. Upon information and belief, Microsoft has promoted use of the Accused Games and Accused Game Engines, which perform one or more methods claimed in one or more of the method claims of the '488 Patent, by third-party end users and third-party video game developers of the Accused Games and Accused Game Engines. Microsoft has promoted such use of the Accused Games and Accused Game Engines with the knowledge that such use would result in performance of one or more methods of one or more of the method claims of the '488 Patent. Performance of the lighting and shadowing methods claimed in one or more of the method claims of the '488 Patent is an essential part of the functionality of the Accused Game Engines and Accused Games. Upon information and belief, Microsoft provides third-party end users

with instructions regarding how to install and play Accused Games with the knowledge that doing so will result in performing one or more of the methods claimed in the method claims of the '488 Patent. Upon information and belief, Microsoft has intended, and continues to intend, to induce third-party end users and video game developers to use the Accused Games or Accused Game Engines to perform one or more of the methods claimed in the method claims of the '488 Patent.

75. Upon information and belief, Microsoft has promoted use of the Accused Xbox Consoles to play Accused Games performing one or more of the methods claimed in one or more of the method claims of the '488 Patent. Microsoft has promoted such use of the Accused Xbox Consoles with the knowledge that it would result in performance of one or more of the methods of one or more of the method claims of the '488 Patent. Upon information and belief, Microsoft has intended, and continues to intend, to induce third-party end users of the Accused Xbox Consoles to use the Accused Games on those devices to perform one or more methods of claimed in the method claims of the '488 Patent.

76. Upon information and belief, Microsoft has promoted use of the Accused Surface Computing and Gaming Devices by third-party end users to play Accused Games performing one or more of the methods claimed in one or more of the method claims of the '488 Patent. Microsoft has touted that the Windows 10 Pro operating system used by the Accused Surface Computing and Gaming Devices is “the best Windows ever for gaming,” and that such devices are a “gaming powerhouse” providing an “immersive” gaming experience with “amazing built-in features like the Game Bar.” Microsoft has promoted such use of the Accused Surface Computing and Gaming Devices with the knowledge that it would result in performance of one or more of the methods of one or more of the method claims of the '488 Patent. Upon

information and belief, Microsoft has intended, and continues to intend, to induce third-party end users of the Accused Surface Computing and Gaming Devices to use the Accused Games on those devices to perform one or more methods of claimed in the method claims of the '488 Patent.

77. Upon information and belief, Microsoft has had knowledge that its conduct of designing, developing, promoting, providing and selling the Accused Instrumentalities would cause third-party end users and third-party video game developers to perform one or more methods claimed in one or more of the method claims of the '488 Patent, or has been willfully blind to the possibility that its acts would induce such direct infringement. On information and belief, Microsoft is or should be aware that the Accused Games and Accused Game Engines perform one or more of the lighting and shadowing methods of one or more of the method claims of the '488 Patent and, therefore, that third-party end users and video game developers using the Accused Instrumentalities will directly infringe the '488 Patent by using the Accused Game Engines and Accused Games.

78. Plaintiffs have been damaged by Microsoft's activities infringing the '488 Patent.

79. As alleged above, Microsoft has had actual notice of the existence of the '488 Patent since at least 2005 and has been intimately familiar with the nature and scope of the claims of the '488 Patent. Microsoft has designed the Accused Games using the Accused Game Engines for the specific purpose of perform the methods of the asserted method claims of the '488 Patent and enabling users of these Accused Game Engines and the Accused Games to perform those infringing methods. Microsoft also has promoted use of the Accused Games performing the methods of the asserted method claims of the '488 Patent by customers and end users of the Accused Games with the knowledge that such use of the Accused Games would

result in performance of the methods of the asserted method claims of the '488 Patent by customers and end users of the Accused Games. Microsoft has also designed the Accused Xbox Consoles and the Accused Surface Computing and Gaming Devices with the knowledge that the Accused Xbox Consoles and the Accused Surface Computing and Gaming Devices comprise the claimed apparatuses of the asserted apparatus claims of the '488 Patent. Microsoft, by virtue of its prosecution of the Microsoft Patent Application and other knowledge, has understood that there is no prior art that invalidates the asserted method claims of the '488 Patent. Microsoft's knowing infringement of the asserted method and apparatus claims of the '488 Patent has been egregious and willful. Plaintiffs, therefore are entitled to enhanced damages pursuant to 35 U.S.C. § 284.

#### **DEMAND FOR JURY TRIAL**

80. Plaintiffs, under Rule 38 of the Federal Rules of Civil Procedure, request a trial by jury of any issues so triable.

#### **PRAYER FOR RELIEF**

WHEREFORE, Plaintiffs request the following relief:

1. A judgment in favor of Plaintiffs that Defendant has directly infringed, and/or has indirectly infringed by way of inducement and/or contributory infringement, one or more claims of the Asserted Patents;
2. A judgment that Plaintiffs have been irreparably harmed by Defendant's infringing activities and are likely to continue to be irreparably harmed by Defendant's continued infringement;
3. A judgment and order requiring Defendant to pay Plaintiffs damages adequate to compensate for infringement under 35 U.S.C. § 284, which damages in no event shall be less

than a reasonable royalty for the use made of the inventions of the Asserted Patents, including pre- and post-judgment interest and costs, including expenses and disbursements;

4. A judgment and order requiring Defendant to pay Plaintiffs enhanced damages pursuant to 35 U.S.C. § 284; and

5. Any and all such further necessary relief as the Court may deem just and proper under the circumstances.

Dated: April 11, 2018

Respectfully submitted,

**BUETHER JOE & CARPENTER, LLC**

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